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Mississippi River Panel 01P

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Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

HANCOCK COUNTY,
UNINCORPORATED AREAS,
ILLINOIS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates tne existence and severity of flood hazards in the Unincorporated Areas of Hancock County, Illinois, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared originally for purposes other than the National Flood Insurance Program. The data were identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. The Federal Emergency Management Agency (FEMA) performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the National Flood Insurance Program. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, Federal Emergency Management Agency, Chicago, Illinois for consideration for revision of this study.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were obtained from "Upper Mississippi River, Water Surface Profiles, River Mile 0.0 to River Mile 847.5" (Reference 1).

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1.3 Coordination

On June 25, 1985, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Hancock County, Illinois. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

The areas studied by detailed methods were selected based upon the extent and validity of available existing hydrologic and hydraulic data. Flooding caused by overflow of the Mississippi River within the corporate limits was studied in detail.

Approximate methods of analysis were used to study all remaining areas having a potential flood hazard that did not have detailed scientific or technical data available.

2.2 Community Description

Hancock County, located in west-central Illinois, is bordered by Henderson County on the north, McDonough and Schuyler Counties on the east, Adams County on the south, and Clark County, Missouri, and Lee County, Iowa, on the west. In 1980, the population of the county was reported to be 23,877 (Reference 2).

The climate in Hancock County is subhumid midcontinental, with an average annual precipitation of 35 inches. Winter is characterized by dry cold occasionally broken by storms of short duration. Beginning with spring, the frequency and intensity of precipitation increases to a maximum in June. The mean temperature is 57 degrees Fahrenheit (F.). January is the coldest month, averaging 25 degrees F., and July is the warmest month, averaging 77 degrees F. (Reference 3).

2.3 Principal Flood Problems

Although large floods from heavy general storms have occurred in the Mississippi River basin, the main flood season is early spring. The basin area covered by a heavy intense storm is generally small in comparison to the total basin area in the study reach. Flood stages rise slowly and remain high for relatively long periods. At the Keokuk tailwater gage during the 1973 flood, the river rose from a low water stage of 8.2 feet to a peak stage of approximately 23.4 feet in about 40 days. The river remained near or above the 16-foot flood stage for approximately 50 days. The river had three peaks during the 1973 flood with the April 27 peak listed as the maximum on record.

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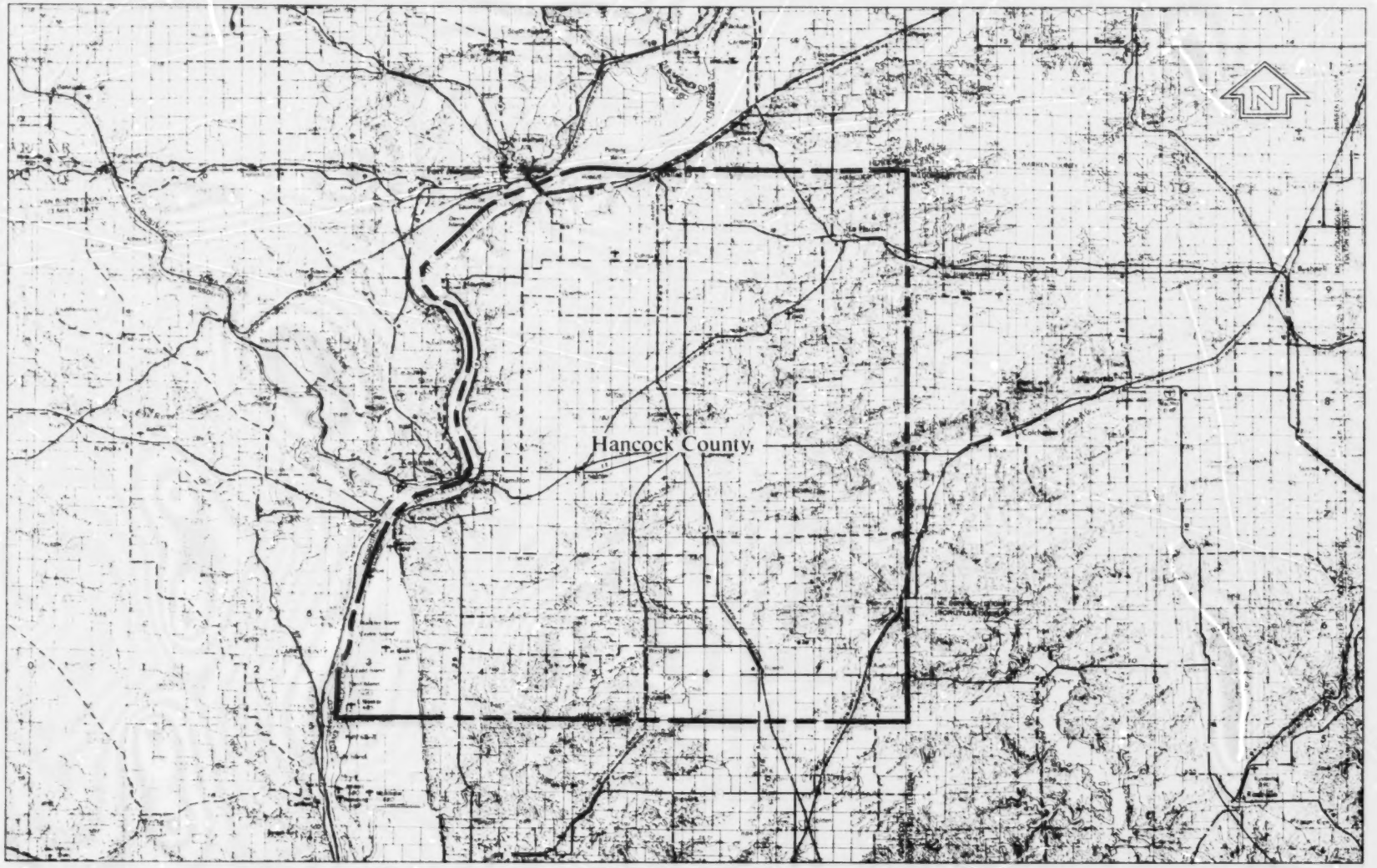

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, IL
(UNINCORPORATED AREAS)

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

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Crest stages and discharges for the 10 highest floods at the Keokuk, Iowa gage are shown in the following table.

HIGHEST TEN KNOWN FLOODS*
AT KEOKUK, IOWA TAILWATER GAGE MILE 364.1

Order No.	Date of Crest	Gage Heights		Estimated Peak Discharge (cfs)
		Stage feet	Elevation° feet	
1	April 27, 1973	23.35	500.75	344,000
2	May 1, 1965	22.14	499.54	327,000
3	May 18, 1888	19.60	497.00	314,000
4	June 29, 1892	19.25	496.65	306,000
5	October 31, 1881	18.90	496.30	293,000
6	April 4, 1960	21.83	499.23	289,500
7	June 29, 1880	17.50	494.90	271,000
8	June 6, 1903	19.60	498.00	270,000
9	April 29, 1951	20.30	497.70	265,100
10	May 27-28, 1944	20.85	498.25	256,000

*In order of flow magnitude.

°National Geodetic Vertical Datum of 1929 (NGVD).

Information on historical floods in the study reach was obtained from stream gaging station records maintained by the U.S. Geological Survey, the U.S. Army Corps of Engineers, and Union Electric Company. High-water marks were obtained and newspaper files and historical documents were researched for information concerning past floods.

The flood of April 1965 in the study reach was caused by a combination of hydrologic factors contributing to a high rate of runoff. Precipitation in August and September 1964 in the upstream areas of the Upper Mississippi River basin was considerably above normal. As a result, the ground was nearly saturated when very cold temperatures in December caused deep frost penetration. The deep frost made the ground impervious to snowmelt and spring rainfall. Normal snowfall followed over most of the Upper Mississippi River basin during December 1964 and January 1965. Early in February, 0.5 to 1 inch of rain fell with above freezing temperatures. The

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snowcover absorbed the rain and increased in density. Above normal snowfall occurred during March with exceptionally heavy amounts in the basin above Minneapolis and St. Paul. Below normal temperatures were recorded through January, February, and March. After the first of April, temperatures rose to and remained above freezing. The heavy runoff from the general spring thaw in combination with that from heavy rainfall during April, caused record flooding on the Mississippi River between Dubuque, Iowa, and Hannibal, Missouri. Runoff from snowmelt on the tributary streams in Iowa and Illinois occurred before the crest on the main stem arrived.

The flood of 1973 was the highest flood in history within the study reach.

2.4 Flood Protection Measures

Levees exist in the study area that provide the community with some degree of protection against flooding. However, it has been ascertained that certain levees may not protect the community from rare events such as the 100-year flood. The criteria used to evaluate protection against the 100-year flood are 1) adequate design, including freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect against the 100-year flood are not considered in the hydraulic analysis of the 100-year flood plain.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Discharges for the Mississippi River were determined using data from various gaging stations on the Mississippi River and by following the guidelines in Bulletin No. 17 (References 1 and 4).

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Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MISSISSIPPI RIVER					
at Gregory Landing	N/A	274,000	345,000	371,000	436,000
at Upper Keokuk Lock	N/A	247,000	320,000	351,000	410,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals.

Flood profiles for the Mississippi River were determined using gaging station rating curves (Reference 1).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been drawn.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown on the profiles are, thus, considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 5).

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For the streams studied by approximate methods, only the 100-year flood plain boundary was delineated using the Flood Hazard Boundary Map for Hancock County (Reference 6).

The 100- and 500-year flood plain boundaries are shown on the Flood Boundary Floodway Map. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Floodways have not been computed for the Mississippi River within the county.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting Hancock County.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the weighted average difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the riverine flooding sources of Hancock County are shown on the Flood Profiles and summarized in Table 2, Flood Insurance Zone Data.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

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The FHF for a riverine reach is the weighted average difference between the 10- and 100-year flood water-surface elevations rounded to the nearest 0.5 foot, multiplied by 10, and shown as a 3-digit code. For example, if the difference between elevations is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zones A1, A5, A10, A11:	Special Flood Hazard Areas inundated by the 100-year flood, with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- and 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and, areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 2, Flood Insurance Zone Data.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for Hancock County is, for insurance purposes, the principal product of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines for riverine flooding sources show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
MISSISSIPPI RIVER							
REACH 1	0200,0170,0260, 0300,0270	−5.0	−1.4	3.5	050	A10	VARIES—SEE MAP
REACH 2	0180	−5.5	−1.5	3.0	055	A11	VARIES—SEE MAP
REACH 3	0090,0180	−0.5	−0.2	0.2	005	A1	VARIES—SEE MAP
REACH 4	0015,0020,0030, 0050,0080,0090	−2.5	−1.0	1.5	025	A5	VARIES—SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, IL

(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

MISSISSIPPI RIVER

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6.0 OTHER STUDIES

Flood Insurance Studies have been published for the Cities of Hamilton, Dallas City, and Warsaw, Illinois, and the Village of Pontoosuc, Illinois (References 7-10). Studies have been completed for the Cities of Fort Madison, Montrose, and Keokuk, Iowa, and the Unincorporated Areas of Lee County, Iowa (References 11-14). This study matches the above referenced studies exactly.

Studies are in progress for the Unincorporated Areas of Adams, Schuyler, and Henderson Counties, Illinois (References 15-17). This study matches those studies exactly.

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Hancock County (Reference 6).

7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, Chicago, Illinois 60606.

8.0 REFERENCES AND BIBLIOGRAPHY

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2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Illinois, Washington, D.C., February 1982.

3. ---------, National Oceanic and Atmospheric Administration, Environmental Data Services, Climatological Data for Illinois, Asheville, North Carolina, September 1979.

4. U.S. Water Resources Council, Bulletin No. 17, Guidelines for Determining Flood Flow Frequency. March 1976.

5. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 feet: Colusa, 1964; Dallas City, 1975; Nauvoo, 1975; Lima, 1981; Niota, 1964; Hamilton, 1964; Illinois; Keokuk, 1964; Fort Madison, 1964; Iowa.

6. Federal Emergency Management Agency, Flood Hazard Boundary Map, Hancock County, Unincorporated Areas, Illinois, December 1981.

7. ---------, Flood Insurance Study, City of Hamilton, Hancock County, Illinois, October 1983.

8. ---------, Flood Insurance Study, City of Dallas City, Henderson County, Illinois, October 1983.

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11. ————, Flood Insurance Study, City of Fort Madison, Lee County, Iowa, May 1982.

12. ————, Federal Insurance Administration, Flood Insurance Study, City of Montrose, Lee County, Iowa, January 1981.

13. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Keokuk, Lee County, Iowa, March 1978.

14. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Lee County, Unincorporated Areas, Iowa, June 1981.

15. ————, Flood Insurance Study, Adams County, Unincorporated Areas, Illinois, in progress.

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17. ————, Flood Insurance Study, Henderson County, Unincorporated Areas, Illinois, in progress.

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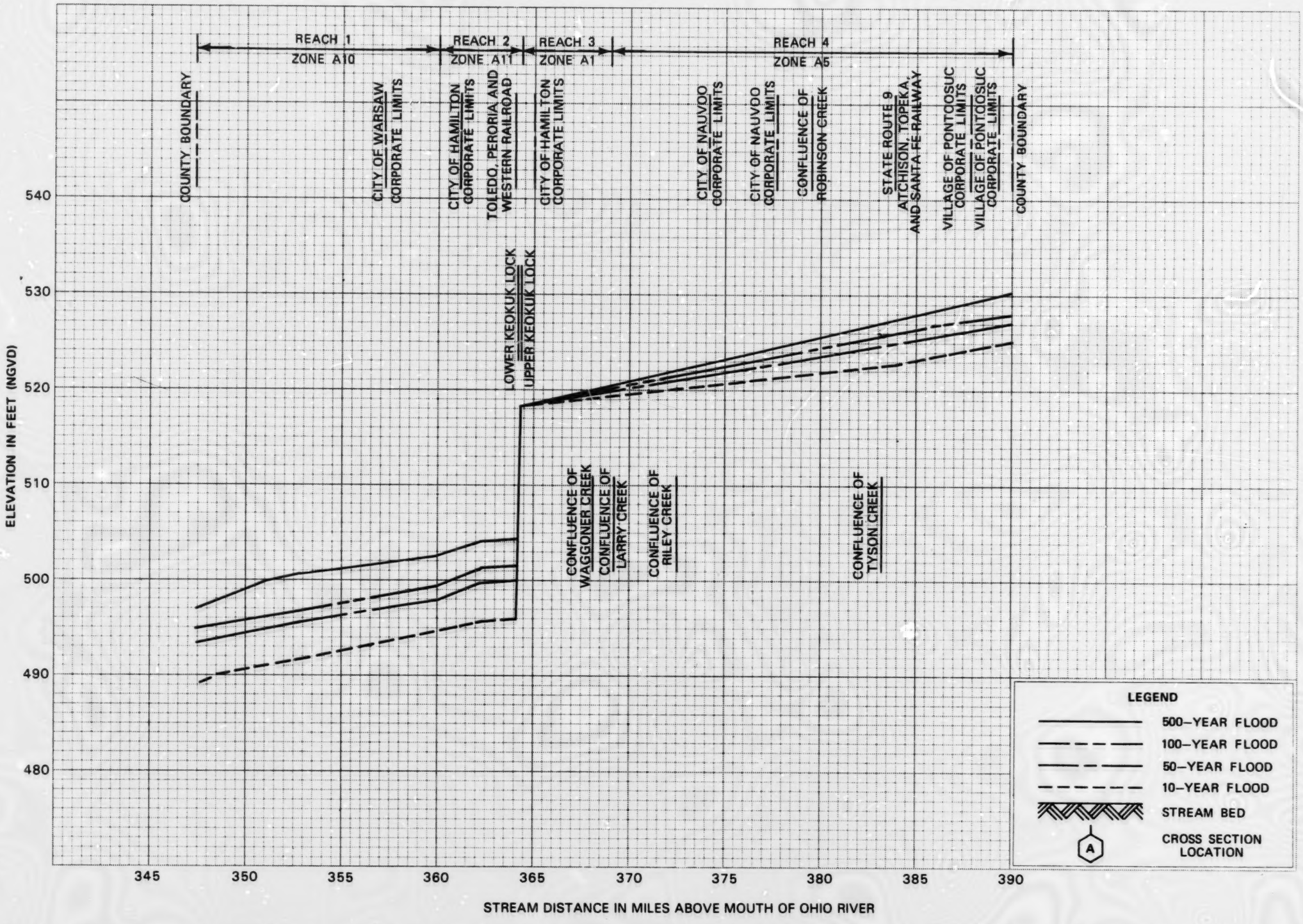

FLOOD PROFILES

MISSISSIPPI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, IL

(UNINCORPORATED AREAS)

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